California Environmental Protection Agency

Environmental Technology Certification Program

Evaluation Report

PennzSuppress® D
Dust Suppressant

Pennzoil-Quaker State Company

January 2001

Equipment:	PennzSuppress® D
Applicant:	Pennzoil-Quaker State Company 700 Milam Street P. O. Box 2967 Houston, Texas 77252-2967
Applicant Contact:	Mr. Colin Kimball
Title:	Product Manager
Phone Number:	(713) 546-6126
E-Mail:	colinkimball@pennzoil.com
Website:	www.pennzsuppress.com
Certificate Number:	00-08-001
Certificate Date:	August 15, 2000
Air Resources Board Contact:	Mr. Hafizur Chowdhury
Phone Number:	(916) 327-5626
E-Mail:	hchowdhu@arb.ca.gov
ARB Website:	www.arb.ca.gov
State Water Resources Control Board Contact:	Mr. Bryan Brock
Phone Number:	(916) 227-4574
E-Mail:	brockb@cwp.swrcb.ca.gov
SWRCB Website:	www.swrcb.ca.gov
CalCert Website:	www.calepa.ca.gov/calcert

ABSTRACT

This report documents the California Environmental Technology Certification Program's (CalCert's) evaluation of the Pennzoil-Quaker State Company's PennzSuppress® D dust suppressant. Staffs from the California Environmental Protection Agency have recommended certification of the following performance claims for the PennzSuppress® D dust suppressant:

- PennzSuppress® D, when topically applied as a dust suppressant in accordance with the manufacturer's instructions, including a target concentration of 0.15 gallons of concentrate per square yard of treated surface, reduces PM_{10} emissions by approximately 85 percent after 7,000 vehicle (predominantly light-duty) passes on an engineered unpaved road consisting of a well-graded aggregate.

- PennzSuppress® D does not contain concentrations of the metals listed in Title 22, Section 66261.24(a)(2)(A) of the California Code of Regulations (CCR) greater than their corresponding Soluble Threshold Limit Concentration (STLC) and Total Threshold Limit Concentration (TTLC) values with 95 percent confidence.

- The 96-hour 50 percent Lethal Concentration (LC50) of PennzSuppress® D (4:1 dilution in water) for fathead minnows, *Pimephales promelas*, is greater than 750 mg/L using the aquatic bioassay protocol found in Title 22, Section 66261.24(a)(6) of the CCR.

- PennzSuppress® D (4:1 dilution in water, applied to sediment) exhibits no toxicity to freshwater amphipod, *Hyalella azteca*, based on the Standard Test Methods for Measuring the Toxicity of Sediment-Associated Contaminants with Freshwater Invertebrates (ASTM E 1706-95b).

- The acute toxicity (48-hour LC50) and chronic toxicity (7-day No Observed Effect Concentration (NOEC)) of PennzSuppress® D (4:1 dilution in water) for water flea, *Ceriodaphnia dubia*, are 267 ppm (survival) and 32 ppm (reproduction), respectively.

- The acute toxicity (96-hour LC50) and chronic toxicity (10-day NOEC) of PennzSuppress® D (4:1 dilution in water) for rainbow trout, *Oncorhynchus mykiss*, are 913 mg/L (survival) and 135 mg/L (growth), respectively.

CalCert's certification is valid for three years, presuming the holder complies with the terms and conditions identified in this report. Certification does not exempt the holder, its distributors and customers from applicable federal, state, and local laws, rules and regulations with respect to the manufacture, transport, sale, storage, application and disposal of the product.

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
ENVIRONMENTAL TECHNOLOGY CERTIFICATION PROGRAM

EVALUATION OF THE PENNZOIL-QUAKER STATE COMPANY'S PENNZSUPPRESS® D DUST SUPPRESSANT

CERTIFICATE NO. 00-08-001
JANUARY 2001

By the Staffs of:
Air Resources Board
State Water Resources Control Board
Office of Environmental Health Hazard Assessment

TABLE OF CONTENTS

APPENDICES

TABLES

FIGURES

I. INTRODUCTION

This report discusses the PennzSuppress® D dust suppressant manufactured by the Pennzoil-Quaker State Company, the performance claims evaluated by the California Environmental Technology Certification Program (CalCert), the test results compiled by in-house and independent laboratories, and the findings and recommendations of the California Environmental Protection Agency (Cal/EPA) staff regarding this technology.

A. Certification Program Background

CalCert is a voluntary program for manufacturers seeking an independent evaluation and certification of their technologies' performance. Certification efforts within Cal/EPA are authorized under Section 71031 of the California Public Resources Code.

The program consists of three components: (1) the Air Resources Board's (ARB's) Equipment and Process Precertification Program; (2) the State Water Resources Control Board's (SWRCB's) Environmental Technology Certification Program; and (3) the Department of Toxic Substances Control's (DTSC's) Hazardous Waste Technology Certification Program. Technical expertise for CalCert is drawn from all of Cal/EPA's boards, departments and offices, including the three aforementioned organizations and the Office of Environmental Health Hazard Assessment (OEHHA). On Cal/EPA's behalf, the Office of Environmental Technology coordinates technology certification activities within the agency.

Equipment, processes or products eligible for certification must: (1) have an environmental benefit; (2) be commonly-used or market-ready; and (3) not pose a significant potential hazard to public safety and the environment. Furthermore, applicants for the program must demonstrate that they can consistently and reliably produce technologies that perform at least as well as that considered in the CalCert evaluations.

Under CalCert, manufacturers request that Cal/EPA staff conduct an independent third-party evaluation and certification of performance claims, focusing on their environmental benefits. The evaluation is based on a detailed review of validation materials submitted by the manufacturer, including original data generated by independent and in-house laboratories, whose findings are considered reliable by Cal/EPA staff.

If the claims are certified, the manufacturer may refer to the results of Cal/EPA's evaluation in its marketing literature. Certification does not imply that the technology has been permitted for any application. However, the information in the evaluation report may be used by a regulatory authority as background and performance information needed

to obtain an environmental permit. Permitting authority is maintained by the applicable environmental regulatory agency.

The performance claims for PennzSuppress® D involve air and water related issues. The certification of these claims falls within the jurisdictional authority of the ARB and SWRCB:

- On June 14, 1996, the ARB adopted Section 91400 of the California Code of Regulations, which incorporates the Criteria for Equipment and Process Precertification (Criteria). The regulation and Criteria were approved by the California Office of Administrative Law on October 31, 1996, and became effective on November 30, 1996.

- At a September 1997 Board meeting, the SWRCB adopted Resolution 97-078-CWP and the Implementation Policy for its Environmental Technology Certification Program.

B. Technology Overview

According to literature provided by the Pennzoil-Quaker State Company, PennzSuppress® D contains binding agents to hold soil particles together and prevent them from being dispersed in the air. It is formulated with a blend of wetting agents, emulsifiers and dispersants to allow for penetration of the binding agents into the soil, emulsification with water, and spreading power for the diluted mixture. PennzSuppress® D readily emulsifies and remains highly stable in its dilute form.

C. Environmental Significance

The primary environmental significance of PennzSuppress® D is that it reduces fugitive dust emissions from unpaved roads. The reduction of PM_{10} emissions from unpaved roads is part of Cal/EPA's strategy to achieve and maintain healthful air quality in California.

PM_{10} emissions can adversely affect the respiratory system and can cause decreased visibility. In an effort to make progress toward attaining healthful air quality in California, regulations restrict PM_{10} emissions from a broad spectrum of activities. PM_{10} emissions are formed as products of combustion or as fugitive dust. Fugitive dust is any solid particulate matter that becomes airborne, other than that emitted from an exhaust stack, directly or indirectly as a result of human activity. The primary chemical constituents of fugitive dust are oxides of silicon, aluminum, and iron, and some calcium compounds. Examples of fugitive dust source include agricultural operations, construction activities, dry lakebeds, and unpaved roads.

Unpaved roads are any unsealed roads, equipment paths, or travel ways that are not covered by one of the following: concrete; asphaltic concrete; recycled asphalt; asphalt; or other materials with equivalent performance. Fugitive dust emissions from unpaved roads are caused primarily by movement of vehicles and equipment, and spillage from haul loads. Emissions from unpaved roads can also be caused when mud from a wet unstabilized road surface sticks to vehicle tires or undercarriages, is tracked onto paved roads, and upon drying generates fugitive dust when subjected to vehicle traffic.

As a vehicle traverses an unpaved road, the force of its wheels on the road surface pulverizes the surface material. Particles are lifted and dropped from the rolling wheels by the wind-shearing action generated from the passing vehicle. The turbulent wake behind the vehicle continues to act on the road surface after the vehicle has passed. The wind shear lifts particles that are smaller than 425 microns (sand size and smaller) from the road surface to generate dust.

The measures available to suppress PM_{10} emissions from unpaved roads include reduction of vehicular trips, speed control, surface modification, and surface treatment. The reduction of vehicular trips is accomplished by restricting access (such as bussing of employees) or redirecting vehicle traffic. Speed control involves limiting vehicle speeds to no greater than 15 miles per hour through the use of employee training, the posting of signs, the installation of speed bumps, and other speed control measures. Surface modification is the covering of unpaved roads with materials such as asphalt, concrete, recycled road base, or gravel. Surface treatment includes frequent watering, application of hygroscopic materials (such as chloride salts and wood pulp by-products), and application of chemical stabilizers such as PennzSuppress® D.

Soil type does not appear to have a measurable influence on the effectiveness of chemical dust suppressants. In fact, the 1987 United States Environmental Protection Agency (U.S. EPA) report used to develop emissions factors for unpaved roads indicated that it did not appear possible to develop a meaningful expression that related the control performance of chemical suppressants to the amount of silt (a parameter used to classify soils) present on the road surface.

Generally, introduction of dust suppressants to surface water would be unlikely since dust suppressants: (1) are not applied during wet weather; and (2) polymerize very rapidly with the soil. The most probable transport mechanism would be erosion of polymerized soil due to a rain event, and the quantities transported by this vehicle would be minimal. For this reason, CalCert's evaluation assumes that only minute amounts of eroded product attached to soil would likely be introduced to surface waters.

D. Regulatory Issues

Eleven air quality management plans have been prepared by air pollution control and air quality management districts (Districts) for areas within their jurisdiction that did not attain the National Ambient Air Quality Standard for PM_{10}. Many of these plans have included the development of rules governing a number of sources of fugitive dust, including unpaved roads. Districts in California do not require that an air quality permit be obtained prior to the application of a dust suppressant. However, air Districts do require that a chemical dust suppressant meet any specifications, criteria or tests required by federal, state or local water agencies. Most Districts disallow the use of chemical stabilizers that are prohibited from use by the Regional Water Quality Control Boards (RWQCBs), ARB, U.S. EPA, or any applicable law, rule, or regulation.

Section 13260(a) of the California Water Code requires that any person discharging waste that could affect water quality file a report of waste discharge. If the application of a dust suppressant threatens water quality, a report must be filed with the appropriate RWQCB, which will make a determination of the acceptability of using a dust suppressant for the application in question.

The DTSC and its four regional offices regulate the management of hazardous waste in California. After reviewing the PennzSuppress® D Toxicity Characteristics Leaching Procedure results, Material Safety Data Sheet, and other product information, the DTSC's staff indicated that it would not expect the product to be regulated as a hazardous waste.

E. Evaluation Process

In 1997, Pennzoil-Quaker State Company contacted Cal/EPA staff about certification of its PennzSuppress® D dust suppressant. The ARB's and SWRCB's staffs provided pre-application assistance to the company and, in 1999, Pennzoil-Quaker State Company formally submitted data on the dust suppressant for evaluation.

The ARB's staff evaluated the air-related claim and documented its findings in the August 2000 document, Evaluation of the Air Quality Performance Claims for the Pennzoil-Quaker State Company PennzSuppress® D, the content of which has been incorporated into this report. Issued on August 15, 2000, ARB Executive Order G-096-029-031 (Appendix B) provides precertification for the air claim.

Using test parameters and methods pre-approved by the SWRCB's staff, Pennzoil-Quaker State Company generated data to support their water-related claims, and submitted the test results on October 27, 1999. The

SWRCB did not have staff available to review the submittal; therefore, expertise for the evaluation was obtained from the OEHHA. In a memorandum dated September 8, 2000, the OEHHA's staff documented its findings, noting questions regarding the testing procedures. In a memorandum dated October 20, 2000, the SWRCB's staff addressed OEHHA's concerns, confirming their acceptance of the test methods. Both memoranda are provided in Appendix C.

II. TECHNOLOGY DESCRIPTION

A. Manufacture/Ownership Rights

The recommendations in this report are contingent upon Pennzoil-Quaker State Company having the legal rights to produce and market PennzSuppress® D. Pennzoil-Quaker State Company documented its ownership of these rights in a letter to the ARB's staff, dated April 6, 1998.

B. Product Composition

PennzSuppress® D dust suppressant is a patented product designed to control dust, stabilize soil and control silt run-off from unpaved roads, parks, and fields.

PennzSuppress® D is composed primarily of a petroleum resin that contains C-25 and higher hydrocarbons. The Material Safety Data Sheet for PennzSuppress® D states that it is composed of 30 to 60 percent of petroleum resins, 20 to 40 percent water, 15 to 35 percent emulsifiers, 1 to 5 percent surfactants, and 5 to 15 percent vacuum residuum. The petroleum resin is produced from the vacuum tower bottoms of the refining process for highly parafinnic Pennsylvania Grade crude oil.

C. Mechanism of Action

PennzSuppress® D relies upon its high carbon-index resin to agglomerate a road's soil particles, and increase the cohesion among the aggregate particles. The agglomeration potential and the increase in cohesion hold the aggregate, including the dust particles, in place. The agglomeration of finer dust particles into larger masses increases the particle size and weight of dust-prone particles, thereby reducing the amount of dust generated by the passing vehicle. As weathering occurs on a road treated with PennzSuppress® D, the resin in the road becomes harder and starts to take on the appearance of asphalt.

Because C-20 and higher compounds are not soluble in water, PennzSuppress® D does not dissolve and wash away when exposed to

rain. Because of its low solubility in water, PennzSuppress® D is not influenced by moisture in the atmosphere and, thus, can be used in both arid and humid environments.

D. Appropriate Uses

PennzSuppress® D is used as a fugitive dust suppressant, as a soil-compacting agent, and to control silt runoff. It is applied primarily to soils on roads, parking lots, parks, fields, offhighway motor vehicle parks, and other similar high dust areas. It can also be used to reduce windblown dust from ore and coal storage piles and to control dust mites in orchards and vineyards. However, CalCert only considered the use of PennzSuppress® D on engineered unpaved roads consisting of well-graded aggregate. In this evaluation, the term "engineered unpaved road" means a purpose-built road, as opposed to a path or a trail.

Well-graded aggregate is an engineering term that defines road material with a wide range in grain sizes. PennzSuppress® D is not recommended on aggregates that have low abrasion resistance (i.e., those that will crush and form new dust under the weight of vehicles.) Also, it is not recommended that the product be applied when the ambient temperature is below 45 degrees Fahrenheit.

E. Application Procedures

The PennzSuppress® D manufacturer's instructions are contained in the document entitled PennzSuppress® D Recommended Practices for Reducing the Generation of Airborne Particulate Matter from Unpaved Roads. This document is available at www.pennzsuppress.com and in Appendix F of this report.

PennzSuppress® D is delivered to distributors in rail cars, tanker trailers, or in 55 gallon drums. During shipping and storage, PennzSuppress® D should not be allowed to freeze or boil. PennzSuppress® D should be applied at temperatures above 45 degrees Fahrenheit. Prior to removing PennzSuppress® D from its storage vessel, it should be thoroughly mixed.

Pennzoil-Quaker State Company recommends a target concentration of 0.15 gallons of concentrate per square yard of unpaved road surface to achieve optimal dust control. The thickness of the PennzSuppress® D coating and the depth of its penetration into soil are controlled by varying the water-to-concentrate ratio, as well as the total volume of the diluted product per area.

PennzSuppress® D is applied using a liquid application truck with a pressurized spray bar (typically operated at 20 to 30 psi) designed to

apply the product evenly over the roadbed surface. For some situations, heavy equipment may also be needed to condition the roadbed before and after application. This equipment can include a milling/reclaiming machine, a motor grader with blade attachments, a pneumatic rubber-wheel roller, or a vibratory steel drum roller.

Some soil types are best treated with a one-time heavy application of PennzSuppress® D, while others may require several light applications. For example, for some very dry unpaved road surfaces in arid environments, a series of pre-treatments of water or very dilute applications of PennzSuppress® D may be required to "pre-wet" the soil to allow for enhanced penetration. If these series of pre-wetting applications are not applied, a very dry unpaved road in an arid environment may exhibit "beading up," allowing no penetration of the PennzSuppress® D into the soil matrix. In general, the depth of penetration of PennzSuppress® D ranges from in excess of 15 millimeters in moderately permeable aggregates to in excess of 8 millimeters in low permeability aggregates.

Initial preparation of the unpaved road is essential to allow for even and effective treatment with PennzSuppress® D. The road should be free of imperfections such as potholes, wash-boarding, aggregate loss, rutting, etc. Improper drainage should be corrected by constructing a crown/slope on the road, cutting ditches along the length of the road and/or constructing drainage beneath the road surface. Roadways should be crowned to allow rainfall to readily drain into ditches. If the area to be treated is hard and compacted, the surface should be scarified to a depth of one to two inches. All open drains should be covered prior to application.

According to Pennzoil-Quaker State Company, PennzSuppress® D is typically applied in at least two consecutive treatments to achieve the target concentration of no less than 0.15 gallon of concentrate per square yard (0.68 liters per square meter) of unpaved road surface. The second application is required within 7 to 10 days of the first application. Pennzoil-Quaker State Company recommends that the road be rolled after each application. Because PennzSuppress® D penetrates soil and sets up rapidly, roads may be opened up to traffic immediately after treatment without any concern about product residue adhering to vehicles. In warm summer months, PennzSuppress® D cures in less than an hour. Curing time increases as temperature decreases.

The frequency of treatment of PennzSuppress® D will depend on the soil conditions and amount of vehicle traffic. The common industry practice is to retreat with a dust suppressant approximately every 4 to 6 weeks, depending on the nature and amount of vehicle traffic. The control

efficiency claim that is verified in this report assumes that PennzSuppress® D is re-applied every 28 days. It is reasonable to assume that after repeated treatments of PennzSuppress® D, the amount of product required to achieve dust suppression will, to a point, likely decrease over time.

PennzSuppress® D should not be:

- Introduced into storm drains or drainage ditches. (Temporary berms should be used to prevent product from entering storm drains.);
- Applied during or immediately prior to a rain event;
- Applied directly to a stream bank;
- Applied within 100 feet of a sinkhole or any direct conduit to ground water; and
- Applied in a manner that may cause the reporting of an unauthorized discharge to be made to an environmental authority.

F. Health and Environmental Impacts

Based on the review of the Material Safety Data Sheet for PennzSuppress® D, the product would not likely present health impacts significantly different from those associated with asphalt or concrete road paving materials, which are currently used throughout California.

Generally, product introduction to surface water would be unlikely. The basis for this conclusion are: (1) dust suppressants are not applied during wet weather; and (2) these types of products polymerize very rapidly with soil. The most probable transport mechanism for this product would be erosion of polymerized soil due to a rain event, and the quantities transported by this vehicle would be minimal. For this reason, only minute amounts of eroded product attached to soil would likely be introduced to surface water.

The concentrated form of PennzSuppress® D (undiluted) was subjected to the U.S. EPA's Toxicity Characteristics Leaching Procedure (TCLP), which is a test used to assess whether a substance should be handled as a hazardous waste. The results of the "inorganics," "volatiles," and "semi-volatiles" TCLP tests did not show any detectable levels of regulated chemicals. In addition, since the TCLP test was conducted on an undiluted sample, the levels represent the maximum detectable level from the product regardless of application rate or dilution factor. Therefore, Pennzoil-Quaker State Company did not foresee a risk that the TCLP levels would change due to subsequent maintenance applications.

PennzSuppress® D contains hydrocarbons that are primarily C-25 and higher. The results of two laboratory analyses submitted by Pennzoil-Quaker State Company showed no detectable levels of reactive volatile organic compounds (VOCs) in PennzSuppress® D. Therefore, it is reasonable to expect that the use of PennzSuppress® D will not significantly contribute to existing levels of VOCs.

Pennzoil-Quaker State Company, its distributors, and applicators of PennzSuppress® D are required to meet all applicable federal, state and local laws, rules and regulations with respect to the manufacturing, transport, sale, storage, application, and disposal of PennzSuppress® D.

III. PERFORMANCE CLAIMS

CalCert considered six performance claims for PennzSuppress® D. Some of the claims are different from the original claims submitted by Pennzoil-Quaker State Company. Where appropriate, modifications were made to reflect the performance levels supported by available data.

- PennzSuppress® D, when topically applied as a dust suppressant in accordance with the manufacturer's instructions, including a target concentration of 0.15 gallons of concentrate per square yard of treated surface, reduces PM_{10} emissions by approximately 85 percent after 7,000 vehicle (predominantly light-duty) passes on engineered unpaved road consisting of a well-graded aggregate.

- PennzSuppress® D does not contain concentrations of the metals listed in Title 22, Section 66261.24(a)(2)(A) of the California Code of Regulations (CCR) greater than their corresponding Soluble Threshold Limit Concentration (STLC) and Total Threshold Limit Concentration (TTLC) values with 95 percent confidence.

- The 96-hour 50 percent Lethal Concentration (LC50) of PennzSuppress® D (4:1 dilution in water) for fathead minnows, *Pimephales promelas*, is greater than 750 mg/L using the aquatic bioassay protocol found in Title 22, Section 66261.24(a)(6) of the CCR.

- PennzSuppress® D (4:1 dilution in water, applied to sediment) exhibits no toxicity to freshwater amphipod, *Hyalella azteca*, based on the Standard Test Methods for Measuring the Toxicity of Sediment-Associated Contaminants with Freshwater Invertebrates (ASTM E 1706-95b).

- The acute toxicity (48-hour LC50) and chronic toxicity (7-day No Observed Effect Concentration (NOEC)) of PennzSuppress® D (4:1 dilution in water)

for water flea, *Ceriodaphnia dubia*, are 267 ppm (survival) and 32 ppm (reproduction), respectively.

- The acute toxicity (96-hour LC50) and chronic toxicity (10-day NOEC test) of PennzSuppress® D (4 to 1 dilution in water) for rainbow trout, *Oncorhynchus mykiss*, are 913 mg/L (survival) and 135 mg/L (growth), respectively.

IV. EVALUATION OF PERFORMANCE CLAIMS

The CalCert evaluation of PennzSuppress® D consists of two components: (1) consideration of the air-related claim by the ARB's Precertification Program staff; and (2) consideration of water-related toxicity claims by staffs from OEHHA and SWRCB. The two components were conducted independently; however, the results from both are incorporated into this report.

A. Test Methods

The following tests were conducted by Pennzoil-Quaker State Company and its contractors, and submitted to CalCert to substantiate the performance claims for PennzSuppress® D:

- Dust control effectiveness field test;
- Analysis for the metals listed in Title 22, Section 66262.24(a)(2)(A)of the CCR;
- California hazardous waste aquatic toxicity test specified in Title 22, Section 66261.24(a)(6) of the CCR;
- Standard Test Methods for Measuring the Toxicity of Sediment-Associated Contaminants with Fresh Water Invertebrates (ASTM E 1706-95b);
- Daily renewal short-term chronic toxicity test, EA Engineering, Science and Technology EA Protocol ATS-STC-CD-05, Survival and reproduction test with cladeoceran *Ceriodaphnia dubia*; and
- Daily renewal short-term chronic toxicity test, EA Engineering, Science and Technology EA Protocol ATS-STC-GT-02, Larval survival and growth test with a rainbow trout, *Oncorhynchus mykiss* (adapted from 10-day short-term chronic test used by Maine Department of Environmental Protection).

Although they are not standard test methods, the two Science and Technology EA Protocols were deemed acceptable by the SWRCB's staff as daily renewal short-term chronic toxicity tests.

Laboratories accredited under the Environmental Laboratory Accreditation Program (ELAP) 1060, issued by the California Department of Health Services, collected, prepared, and analyzed all of the samples for the water and toxicity claims. The Midwest Research Institute was used to conduct the emission testing for the air-related claim.

B. Effectiveness In Controlling Fugitive Dust

Pennzoil-Quaker State Company contracted with Midwest Research Institute (Midwest) to test the effectiveness of PennzSuppress® D in controlling fugitive dust emissions from unpaved roads. Midwest conducted a series of sampling runs on Linda Vista Road in July 1997. Linda Vista Road is a public unpaved road in Tucson, Arizona.

Traffic during the 28-day sampling period primarily consisted of light duty vehicles traveling between 30 and 35 miles per hour. In addition, deliveries to a nearby dam construction project resulted in approximately 5 passes per day by relatively heavy vehicles (cement mixers). Segregated treated, untreated, and buffer test sections of the unpaved road were created. The buffer section was used to control track-on material from untreated sections onto the treated sections. Figure 1 displays a layout of the test site.

Figure 1- Midwest PM_{10} Testing Site Layout

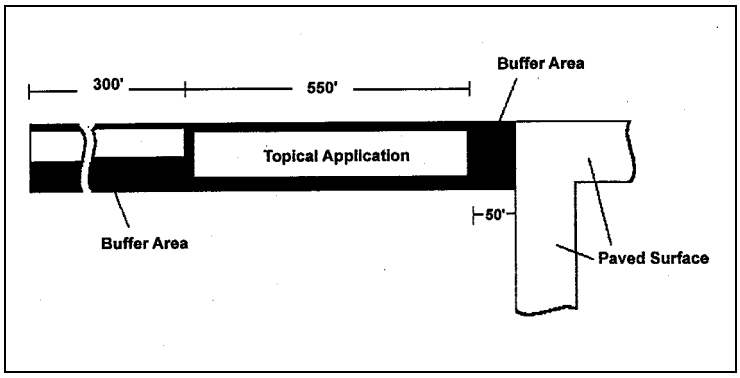
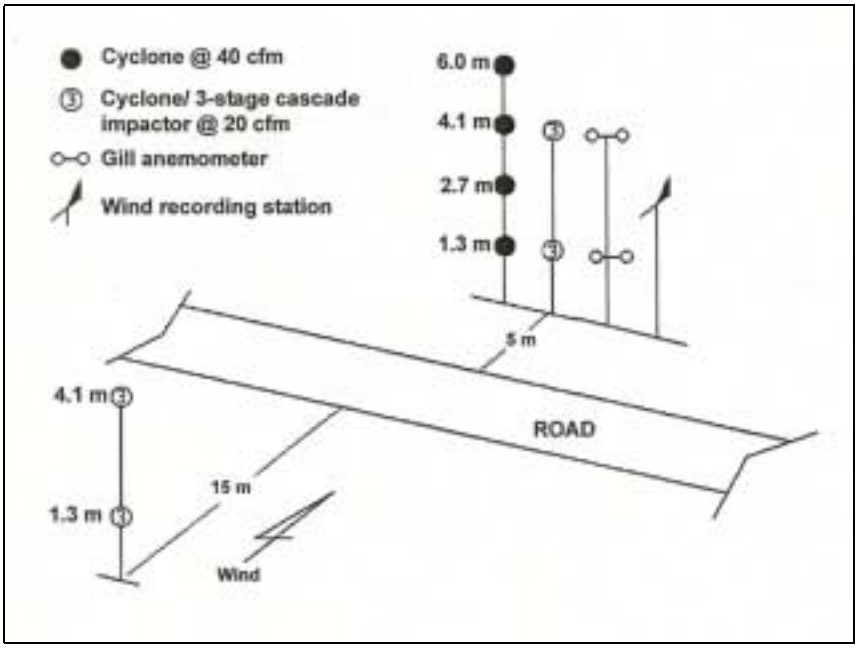


Figure 2 illustrates the testing equipment setup that was used by Midwest to quantify particulate emissions from the segregated untreated and treated portions of the test road. This setup provides simultaneous measurement of particulate concentrations at various points over the

effective height of the plume generated by passing vehicles. The sampling equipment consisted of a high-volume cyclone, operated at 40 cubic feet per minute (cfm), placed downwind of the test area at heights of 1.3, 2.7, 4.1, and 6.0 meters. In addition, high-volume cyclones followed by a 3-stage cascade impactor were operated at 20 cfm and paced upwind (to determine background concentrations) and downwind of the test area at heights of 1.3 and 4.1 meters. The aerodynamic particle sizes measured by this equipment included 15, 10.2, 4.2, and 2.1 microns.

Figure 2 - Midwest PM_{10} Testing Equipment Setup



The setup included meteorological instrumentation that monitored wind direction. The deployment of the particulate samplers and the meteorological equipment is consistent with that used to develop U.S. EPA's AP-42 emission factor equations for paved and unpaved roads. In addition, vehicle passes, vehicle speed, and vehicle weights were monitored. During the test program, several parameters monitored at the test site were not used directly in conducting this evaluation. These included precipitation, wind speed, temperature, barometric pressure, and soil silt content.

Prior to testing, three passes of PennzSuppress® D were applied to the unpaved road. Each pass was applied at a rate of 0.025 gallon per square yard of unpaved road, using a 9:1 dilution rate. Seven days later, the same application rate of PennzSuppress® D was applied to the same portion of the road that had been treated a week earlier. The total ground

inventory of PennzSuppress® D after these two treatments was 0.15 gallons of concentrate per square yard of road. Vehicle traffic was not allowed on the road until after the second application.

Midwest completed a total of six PM_{10} sampling runs, four treated runs from a portion of the road treated with PennzSuppress® D and two untreated runs from a portion of the road that was not treated with PennzSuppress® D. (Midwest invalidated a seventh run because of poor wind conditions.) The sampling periods ranged from 204 to 280 minutes for the treated runs and 38 to 44 minutes for the untreated runs.

As shown in Table D-1 of Appendix D, treated testing runs were conducted at 11, 12, 26, and 28 days after the second application of PennzSuppress® D. During the four treated runs, traffic counts ranged from 392 to 439 vehicles per day with cumulative vehicle traffic totaling 7,000 vehicle passes over the 28-day period. The two untreated testing runs were conducted on the untreated portion of the road. Vehicle passes for these runs were 51 and 63.

After the completion of the "12^{th} day" test, approximately 100 vehicles (approximately one-fourth of which were 18-wheel trucks) detoured from a nearby interstate highway and caused some damage to the testing site buffer area. Midwest hypothesized that this event increased the rate at which fugitive dust control efficiency decreased for PennzSuppress® D.

Midwest determined, through laboratory analysis of the sampler filters, the airborne PM_{10} concentrations for the treated and untreated road surfaces. Using this information, Midwest derived emission factors (expressed in grams per vehicle mile traveled) to calculate the control efficiency of PennzSuppress® D. Using a simpler approach (expressed in micrograms per cubic meter), the ARB's staff calculated the control efficiency for each of the four runs by comparing dust emission measurements from the roads treated with PennzSuppress® D to the untreated roads. Using this approach and the raw data, the ARB's staff obtained results that were consistent with those obtained by Midwest.

Although the ARB's staff confirmed the control efficiencies calculated by Midwest, the ARB evaluation concluded that the average PM_{10} control efficiency of PennzSuppress® D cannot be estimated with statistical confidence due to the limitations in the test design, particularly in the small number of both treated and untreated runs. In addition, the evaluation suggests that the cumulative number of vehicle passes appears to heavily influence the control efficiency of PennzSuppress® D. A detailed explanation of the ARB staff's evaluation is provided in Appendix D. Appendix E contains information about the approach used by Midwest to calculate the control efficiency.

Midwest's results suggest that the cumulative number of vehicle passes appears to heavily influence the control efficiency of the dust suppressant. Over the 28-day test period, the control efficiency ranged from approximately 85 to 99 percent. The highest control efficiency was obtained early in the test schedule after the fewest vehicles passes had occurred. The minimum instantaneous control efficiency suggested by the results of the test program were obtained 28 days after treatment and after 7,000 vehicle passes.

In recognition of the design limitation of the Midwest study, the ARB-verified PennzSuppress® D control efficiency is based on the minimum instantaneous control efficiency that was suggested by the results of the Linda Vista Road test program. Specifically, the Linda Vista Road test results suggest that 85 percent control efficiency was obtained after 7,000 vehicle passes.

C. Metal Concentrations

Pennzoil-Quaker State Company contracted with Sequoia Analytical Laboratory (Sequoia) to analyze for the metals listed in Title 22, Section 66262.24(a)(2)(A) of the CCR. Undiluted samples of PennzSuppress® D were sent to Sequoia for analysis of 17 metals. Table 1 shows the results of the metal analysis and the corresponding STLC and TTLC values.

Table 1 - Chemical Concentrations Detected in PennzSuppress® D Samples

Chemical	Concentration mg/KG 3/98/8/98 (detection limit)	STLC/TCLP* Mg/L	TTLC Mg/Kg
Antimony	ND/ND (5.0)	15	500
Arsenic	ND/ND (5.0)	5.0*	500
Barium	3.9/1.8 (0.50)	100*	10,000
Beryllium	ND/ND (0.5)	0.75	75
Cadmium	ND/ND (0.5)	1.0*	100
Chromium III	0.58/ND (0.50)	5*	2500
Cobalt	ND/ND (0.50)	80	8,000
Copper	1.4/1.1 (0.50)	25	2,500
Lead	ND/ND (0.50)	5.0*	1,000
Mercury	ND/ND (0.01)	0.2*	20
Molybdenum	ND/ND (0.50)	350	3,500
Nickel	ND/ND (1.0)	20	2,000
Selenium	ND/ND (5.0)	1.0*	100
Silver	ND/ND (0.50)	5*	500
Thallium	ND/ND (5.0)	7.0	700
Vanadium	ND/ND (0.05)	24	2,400
Zinc	8.3/4.5 (1.0)	250	5,000

STLC Soluble Threshold Limit Concentration
TTLC Total Threshold Limit Concentration
*Denotes same STLC and TCLP (Toxicity Characteristic Leaching Procedure) values
Source: Application for Certification of PennzSuppress® D Water Related Claims, October 27, 1999

Barium, chromium III, copper and zinc were detected. Table 2 shows the 95 percent confidence intervals for these constituents.

Table 2 – 95% Confidence Intervals for Data with Detectable Concentrations

Metal	3/98 Data	8/98 Data	Mean	Std. Dev.	95% CI	Range High	Range Low
Barium	3.9	1.8	2.85	1.48	2.05	4.90	0.80
Chromium III	0.58	0.5	0.54	0.06	0.08	0.62	0.46
Copper	1.4	1.1	1.25	0.21	0.29	1.54	0.96
Zinc	8.3	4.5	6.4	2.69	3.73	10.13	2.67

Sequoia concluded that PennzSuppress® D does not contain concentrations of the metals listed in Title 22, Section 66261.24(a)(2)(A) of the CCR greater than their corresponding STLC and TTLC levels, with 95 percent confidence.

The OEHHA's staff verified Sequoia's data and findings, but inquired if two samples were sufficient to capture potential variability in product composition. The SWRCB's staff, however, believed that the product quality assurance and quality control plans followed by Pennzoil-Quaker State Company ensure consistent product composition. Therefore, it appeared unlikely that significant variability in chemical composition could exist because of the manufacturing process or starting materials.

D. Hazardous Waste Aquatic Toxicity: *Pimephales promelas*

Pennzoil-Quaker State Company contracted with Block Environmental Services Bioassay Laboratory (Block Laboratory) to perform the California hazardous waste aquatic toxicity test specified in Title 22, Section 66261.24(a)(6) of the CCR. The test generates an acute 96-hour LC50 value, which serves as the numerical indicator of the toxicity of a waste to aquatic life.

The California hazardous waste aquatic toxicity test was completed on the PennzSuppress® D dust suppressant using a 4:1 dilution of the product with tap water. The aquatic toxicity test was performed using fathead minnows, *Pimephales promelas*. The laboratory standard operating procedures were based on the following references:

- California's Title 22 Code, Section 66261.24(a)(6); "*Static Acute Bioassay Procedures for Hazardous Waste Samples,*" Polisini and Miller, 1988, California Department of Fish and Game;

- "*Guidelines for Performing Static Acute Toxicity Fish Bioassays in Municipal and Industrial Waste Waters,*" Kopperdahl, F.R., 1976 California Department of Fish and Game; and

- "*Standard Methods for Examination of Water and Wastewater,*" 18th Edition, American Public Health Association, 1992.

Block Laboratory conducted two aquatic toxicity tests, April 1998 and June 1998. Table 3 shows the test results. The Trimmed-Spearman Karber statistical method was used to analyze the results. The program determines an LC50. For both tests, Block Laboratory concluded that the 96-hour LC50 is greater than 750mg/L.

Table 3 - Aquatic Toxicity Test Results

Treatment Concentration	96-hr % Survival 4/98	96-hr % Survival 6/98
Control	100	100
250mg/L	100	95
500mg/L	100	95
750mg/L	70	100

The OEHHA's staff verified Block Laboratory's findings, but requested clarification from SWRCB on the appropriateness of the test method. The SWRCB's staff confirmed that, for the toxicity tests, a diluted 4:1 product in water was used since the PennzSuppress® D product is applied as an emulsion with a dilution factor (4:1 in water). Because the toxicity tests were conducted using the product as applied, the protocol was in compliance with Title 22, Section 66261.24(a)(6) of the CCR.

The SWRCB's staff did not require tests for analytes with high bioaccumulation potential (e.g., polychlorinated biphenyls, other organochlorine pesticides, polychlorinated dibenzo-p-dioxins and dibenzofurans). Bioaccumulation should be investigated if the threat of product introduction to surface water is great. However, product discharge is believed to be rare or non-existent, yielding bioaccumulation improbable. The added expense of conducting this test did not seem warranted.

E. Sediment-Associated Toxicity: *Hyalella azteca*

Pennzoil-Quaker State Company also contracted with Block Laboratory to test PennzSuppress® D using the Standard Test Methods for Measuring the Toxicity of Sediment-Associated Contaminants with Fresh Water Invertebrates (ASTM E 1706-95b).

Block Laboratory conducted two treated versus non-treated Aggregate Base sediment bioassay tests. The second test was a repeat of the first, except with only four replicates per test sample rather than the normal eight. The tests, initiated on April 20, 1999, and May 5, 1999, exposed the amphipod, *Hyalella azteca*, to both a non-treated sample and the same sample treated with PennzSuppress® D in a 4:1 dilution with tap water. A standard reference toxicant test was run for the species in conjunction with these tests.

According to Block Laboratory, the U.S. EPA Toxicity Data Analysis Software (June 1994, version 1.5) was used to analyze the test results. The Dunnetts portion of the program determines if there is a statistically significant reduction in response at the p=0.05 level. The treated versus non-treated testing compared: (1) the difference between the treated and non-treated Aggregate Base responses; and (2) each of the two soil responses versus the control sediment. The Minimum Significance Difference (MSD) was also determined to give a measure for the sensitivity of the test, quantifying the minimum difference that can be detected as statistically significant.

Table 4 - Aggregate Base Sediment Bioassay Tests Raw Data Summary

Sample Identification	10 Day percent Survival	
	4/20/99	5/5/99
Control Sediment	85	85
Non-Treated Aggregate Base	80	87.5
Treated Aggregate Base	76.3	80

Source: Application for Certification of PennzSuppress® D Water Related Claims, October 27, 1999

Table 5 - Aggregate Base Sediment Bioassay Tests Statistical Analysis

Survival End Point	Significant Reduction? (p=0.05)		MSD (%)	
	4/20/99	5/5/99	4/20/99	5/5/99
Treated vs. Control	No	No	14.8	18.6
Non-Treated vs. Control	No	No	11.0	15.6
Treated vs. Non-Treated	No	No	13.7	16.6
Non-Treated vs. Treated	No	No	13.7	16.6

Source: Application for Certification of PennzSuppress® D Water Related Claims, October 27, 1999

The laboratory control sediment passed the minimum test acceptability criteria for survival ($\geq$80%).

Block Laboratory used Potassium Chloride (KCl) as the reference toxicant for the amphipod (*Hyalella azteca)*. The *Hyalella azteca* treatment levels were 600, 300, 150, 75 and 37.5 mg/L KCl in U.S. EPA Moderately Hard Water. The toxic endpoint (LC50) from the reference toxicant test was subsequently plotted on a running control chart from the last 20 tests. Block Laboratory calculated the mean values and 95 percent confidence limit with each successive test result. Outliers and trends of increasing or decreasing sensitivity are readily identified.

Table 6 - Reference Toxicant Test Raw Data Summary

Sample Concentration (mg/L as KCl)	96 Hour Percent Survival
Control	50
37.5	100
75	100
150	100
300	0
600	0

Source: Application for Certification of PennzSuppress® D Water Related Claims, October 27, 1999

Table 7 - Reference Toxicant Test Statistical Analysis

End Point	mg/L as KCl
Survival LC 50	212.1
Control Chart Avg. (95%CL)	285.4 (154.1 –416.7)

Source: Application for Certification of PennzSuppress® D Water Related Claims, October 27, 1999

The laboratory control water failed to meet the minimum test acceptability criteria for survival ($\geq$90%). The reference toxicant test generated an LC50 endpoint that was within the control chart limitations. Even though the reference toxicant test generated low survivability, the two sediment controls both generated acceptable survival values (85%).

Block Laboratory reached the following conclusions:

- There was no difference in survival rate between the PennzSuppress® D dust suppressant treated Aggregate Base and the non-treated Aggregate Base test exposures.

- There was no difference in the control sediment survival rate as compared against either the treated or non-treated Aggregate Base sediment samples.

- Results obtained from the reference toxicant tests are typical of sensitivity data to KCl, indicating that the organisms used were in acceptable condition.

The OEHHA's staff verified that the submitted sediment toxicity tests met the acceptability criteria of the requested method. Product curing conditions (100°F for 5 days) and dilution factors (4:1 dilution applied to test sediment, then additional dilution in the bioassays) were agreed upon by Block Laboratory and the SWRCB's staff.

The reference toxicity test did not meet minimum test acceptability criteria (control survival was less than 90 percent) and, ideally, the test should have been repeated. However, this failure does not negate the performance claim.

F. Short-Term Chronic Toxicity: *Ceriodaphnia Dubia*

Pennzoil-Quaker State Company contracted with EA Engineering, Science and Technology (EA Engineering) for short-term chronic toxicity tests (EA Protocol ATS-STC-CD-05) using water flea, *Ceriodaphnia dubia*. EA Engineering exposed *Ceriodaphnia dubia* to PennzSuppress® D at a 4:1 dilution with daily renewal of solution. Survival and reproduction were the toxic endpoints. The acute 48-hour LC50 was calculated from the survival data of the short-term chronic toxicity tests. EA Engineering conducted the tests with U.S. EPA moderately hard-reconstituted water at 25°C.

Table 8 - *Ceriodaphnia dubia* Test Data Summary

Test Concentration (ppm 4:1 diluted product)	5-Day Percent Survival	Mean Young Production (±SD)[1]
Control	100	20.8 (±5.3)
18	100	15.6 (±7.1)
32	100	14.9(±6.9)
56	100	13.1(±5.7)[2]
100	100	1.7(±2.4)[2]
180	90	0
320	10	0

Source: Application for Certification of PennzSuppress® D Water Related Claims, October 27, 1999
[1]Standard Deviation (SD)
[2]Significantly different from control (P=0.05) indicating an adverse effect.

Based on control acceptability criteria, EA Engineering terminated the test on Day 5, at which time 80 percent of the control organisms had produced a third brood and there was an average of 20.8 neonates produced per surviving control female. Survival of *Ceriodaphnia dubia* in the highest

test concentration (320 ppm product) concentration was compared to 100 percent control survival. The 320 ppm product concentration was consequently not included in the statistical analysis of reproduction since the 180 ppm concentration already showed a significant difference from the control in survival.

EA Engineering found that mean young production in the lower product concentrations ranged from 0 in the 180 ppm product concentration to 15.6 neonates per organism in the 18 ppm product concentration. Compared to the control (20.8 neonates per organism), reproduction was significantly inhibited in the 180, 100 and 56 ppm product concentrations.

Based on reproduction as the most sensitive chronic endpoint, EA Engineering determined the NOEC for the *Ceriodaphnia dubia* test was 32 ppm product, the Lowest Observed Effect Concentration was 56 ppm product, and the Chronic Value was 42 ppm product. The IC25 value was 18 ppm product and the acute 48-hour LC50 was 267 ppm product.

EA Engineering concluded that the acute toxicity (48-hour LC50) and chronic toxicity (7-day NOEC test) for *Ceriodaphnia dubia* is 267 ppm based on survival and 32 ppm based on reproduction, respectively.

The OEHHA's staff confirmed that presented data indicates the submitted toxicity tests met the acceptability criteria of the requested method. As in other tests, the 4:1 dilution was allowed since the product is applied as an emulsion with a dilution factor equal to that used in the tests.

G. Acute and Chronic Toxicity: *Oncorhynchus Mykiss*

Pennzoil-Quaker State Company also contracted with EA Engineering for short term chronic toxicity tests (EA Protocol ATS-STC-GT-02) using rainbow trout, *Oncorhynchus mykiss,* exposed to PennzSuppress® D dust suppressant at a 4:1 dilution with daily renewal of solution. Survival and growth were the toxic endpoint. EA Engineering calculated the 96-hour LC50 from the survival data.

EA Engineering reported a mean growth rate, expressed as mg/organism/day, for each sample treatment and control of the *Oncorhynchus mykiss* test. The mean growth rate of each replicate was calculated by subtracting a mean initial (Day 0) dry weight representative of the acquired lot of trout from the mean final (Day 10) dry weight and dividing the result by the total number of exposure days (10). The mean growth rate for each concentration was achieved by averaging the rates of the four individual replicates.

Table 9 - Rainbow Trout Toxicity Data Summary

Test Concentration (ppm product)	10-Day Percent Survival	Mean Growth Expressed as mg/org (±S.D.)	Mean Growth Rate Expressed as mg/org/day (±SD)[3]
Control	100	49.2 (±4.0)	2.75(±0.40)
65	97	41.8(±7.8)	2.01(±0.78)
135	98	45.6(±6.2)	2.39(±0.62)
280	97	36.9(±4.0)[4]	1.50(±0.33)
560	95	27.5(±1.1)[4]	0.58(±0.11)
1500	0[5]	0.0	0.00

[3]Standard Deviation (SD)
[4]Significantly different from control (P=0.05) indicating an adverse effect.
[5]A concentration that had no surviving organisms was excluded from statistical analyses of survival and growth.
Source: Application for Certification of PennzSuppress® D Water Related Claims, October 27, 1999

EA Engineering reported that within 48 hours of the *Oncorhynchus mykiss* test initiation, all organisms were dead in the highest product concentration (1,500 ppm). After 10 days of exposure, survival values in the remaining product concentrations were not significantly less (P=0.05) than the control which had 100 percent survival.

Mean dry weights of the surviving organisms in the product concentrations ranged from 27.5 to 45.6 mg/organism. EA Engineering's analysis of the dry weight data revealed an inhibition of growth in the 560 and 280 ppm product concentrations compared to the control (49.2 mg/organism). EA Engineering excluded replicates 280 ppm D, 560 ppm C, and 560 ppm D from the chronic endpoint analyses because the air lines into these replicates became temporally disconnected. These replicates suffered 80 to 100 percent mortality within 24 hours. EA Engineering's best professional judgement was that the mortality was a result of the low dissolved oxygen in these replicate test chambers.

Based on growth, EA Engineering reported that the NOEC for *Oncorhynchus mykiss* was 135 ppm product, the Lowest Observed Effect Concentration was 280 ppm product, and the resulting Chronic Value was 194 ppm product. The IC25 value was 252 ppm product, and the acute 96-hour LC50 value was 913 ppm product.

EA Engineering concluded that the acute toxicity (96-hour LC50) and chronic toxicity (10-day NOEC test) for rainbow trout, *Oncorhynchus mykiss*, are 913 mg/L based on survival and 135 mg/L based on growth, respectively.

The OEHHA's staff verified the submitted toxicity tests as generally meeting the acceptability criteria of the requested method. Three replicates were lost in the 584-18 test due to failure of the aeration system in these chambers and, ideally, the test should have been repeated. However, it is not likely that the results of the repeat toxicity test would have differed significantly. Additionally, the results are comparable to the replicate bioassay that appears to have been conducted prior to the test (584-14). As in other tests, a 4:1 dilution was used since the product is applied as an emulsion with a 4:1 dilution factor.

V. OTHER CONSIDERATIONS

A. Volatile and Semivolatile Organic Compounds

Pennzoil-Quaker State Company contracted with Sequoia Analytical Laboratory to analyze for volatile organic compounds using U.S. EPA Method 8240 and Tentatively Identified Compounds (TICs), and to analyze for semivolatile organic compounds using U.S. EPA Method 8270 and TICs.

Sequoia analyzed two undiluted samples of PennzSuppress® D. The results show that only acetone was detected. Acetone, according to Sequoia, is a common contaminant and, due to the dilution required for analysis, any background contamination would be subject to a multiplication factor, possibly creating a high bias. Therefore, Sequoia concluded that PennzSuppress® D contained no volatile and semivolatile organic compounds above the reported detection limits.

B. Quality Management Practices and Standards

PennzSuppress® D is manufactured exclusively by Pennzoil-Quaker State Company at their ISO 9002-certified manufacturing facilities in Mundy's Corner, Pennsylvania, and Alameda, California. Pennzoil's quality management practices and standards for PennzSuppress® D are described in detail in the Pennzoil-Quaker State Company *Specialty Plant Quality System Manual*.

Each ingredient used in the manufacturing of PennzSuppress® D is obtained from a source-specific vendor. Incoming ingredients are shipped with a Certificate of Analysis that describes the chemical and physical characteristics of the specific shipment. To ensure consistent quality, each incoming ingredient is analyzed at the manufacturing facility for a variety of parameters, including pH, API Gravity, and viscosity. The results of the analyses are compared to the Certificate of Analysis in order

to confirm ingredient purity. If an ingredient does not meet Pennzoil's specifications, it is shipped back to the vendor. Once an ingredient has been qualified, it is received by the facility and placed in storage for use in the blending of PennzSuppress® D.

During the blending of PennzSuppress® D, each ingredient is added to the blending tank in a specific sequence and quantity. The precise quantity of each ingredient is metered into the blending tank in the proper sequence and mixed for a specified period of time. Each instrument used in weighing and metering ingredients is calibrated in accordance with ISO 9002 standards.

Once a blend has been completed, samples of the finished product are collected from the blending tank and analyzed for percent solids, specific gravity, and API Gravity. Another portion of the sample is diluted with water to the typical application dilution of four parts water to one part concentrate and examined. The diluted sample is held for 24 hours and the thickness of a cuff, which commonly develops as a slightly dense emulsion, is measured. The characteristics of the emulsion are also examined under a microscope and qualitatively compared to standards developed by Pennzoil-Quaker State Company for PennzSuppress® D.

Data sheets from each blend are retained in a workbook at each facility and entered into a computer database for future reference. The data sheet records the specific quantity of each ingredient, blending times, blending duration, temperature, and other quality assurance measurements. The data sheets and quality assurance measurements are reviewed; once it is determined that the blend meets PennzSuppress® D specifications, the product is released for sale.

After evaluating the quality management program provided by Pennzoil, the ARB's staff determined that sufficiently comprehensive measures are used in the manufacturing process of PennzSuppress® D to ensure that ingredient quality, manufacturing process consistency, and finished product quality are achieved and maintained.

C. Operator Requirements

PennzSuppress® D is sold in the United States via either select distributors, or directly by PennzSuppress® D representatives. Pennzoil-Quaker State Company trains its distributors and representatives about the product and its application. The distributors or representatives assist customers in determining whether PennzSuppress® D would be effective for certain applications, and if so, what application rate would be suitable. Distributors, in some cases, may also provide equipment and operators to apply PennzSuppress® D.

D. Site Visit

As part of its air evaluation, the ARB's staff contacted current users of PennzSuppress® D. These users indicated that they have been pleased with the performance of PennzSuppress® D as a dust suppressant on unpaved roads. One customer included the California Department of Transportation in Southern California where PennzSuppress® D was used to reduce PM_{10} emissions from on unpaved road surfaces associated with construction of a large freeway project. For its air evaluation, the ARB's staff also visited a winery and vineyard in Central California where PennzSuppress® D was applied to reduce PM_{10} emissions and the associated dust mites that affect grape quantity and quality.

E. Environmental and Economic Benefits

The use of the PennzSuppress® D as a dust suppressant in accordance with the manufacturer's instructions will likely result in a significant reduction of PM_{10} emissions from unpaved roads without contributing to existing levels of volatile organic compounds nor harming California waterways. It should also be noted that under certain conditions, PM_{10} emissions reductions resulting from the use of PennzSuppress® D as a dust suppressant on unpaved roads may be eligible for emission reduction credits. However, individual Districts in California should be consulted to determine the eligibility for any emission reduction credits.

F. Other Certifications/Approvals

Environmental and transportation agencies for the states of Arkansas, Missouri, Nevada, Pennsylvania, Texas, Connecticut, and California have granted approval for use of PennzSuppress® D as a dust suppressant. Product safety and performance information was reviewed to varying degrees by each state. Many of the states also approved PennzSuppress® D for use as a dust suppressant by their own agencies. However, none of the states included the evaluation of a performance claim as part of their reviews. Copies of letters of approval are provided in Appendix G.

G. Warranties

Pennzoil-Quaker State Company warrants that PennzSuppress® D is free of manufacturing defects and the company will replace any PennzSuppress® D product that does not meet manufacturing specifications when delivered from a Pennzoil-Quaker State Company facility.

VI. CONCLUSION AND RECOMMENDATION

Testing results support the air and water related claims for PennzSuppress® D for the specified operating parameters stated in this document. Cal/EPA's staff recommends that the PennzSuppress® D dust suppressant be certified under the California Environmental Technology Certification Program.

VII. CERTIFICATION CONDITIONS

By accepting certification, Pennzoil-Quaker State Company assumes, for the duration of the three year period, responsibility for maintaining the quality of the manufactured equipment and materials at a level equal to or better than was provided to obtain this certification. Certification under the ARB's Precertification Program is also contingent on the recipient agreeing to be subject to quality monitoring by the ARB as provided by law.

The certification is based on the Cal/EPA staff's evaluation of the information listed in Appendix A. The evaluation and recommendations presented in this report are predicated on the expectation that PennzSuppress® D is manufactured, transported, sold, stored, applied and disposed of in accordance with the manufacturer's instructions.

Cal/EPA makes no express or implied warranties as to the performance of the manufacturer's product or equipment. Nor does Cal/EPA warrant that the manufacturer's product or equipment is free from any defects in workmanship or material caused by negligence, misuse, accident, or other causes. The Cal/EPA's staff believes, however, that Pennzoil-Quaker State Company's PennzSuppress® D will achieve the performance levels presented in the performance claims. This determination is based on an evaluation of the data submitted by Pennzoil-Quaker State Company, as well as other information identified in this report. The recommendations of Cal/EPA's staff are predicated on the expectation that transportation, storage, and application are performed in accordance with the manufacturer's instructions contained in the document entitled PennzSuppress® D Recommended Practices for Reducing the Generation of Airborne Particulate Matter from Unpaved Roads.

The Pennzoil-Quaker State Company, its distributors, and/or applicators of PennzSuppress® D are required to meet all applicable federal, state and local laws, rules and regulations with respect to the manufacture, transport, sale, storage, application, and disposal of this dust suppressant.

APPENDIX A

MATERIALS AVAILABLE FOR EVALUATION

1. Request to Determine Eligibility for the ARB Equipment Precertification Program from Mr. Ronald Block of Block Environmental Services (representing Pennzoil-Quaker State Company) to Ms. Kitty Martin of the ARB transmitting the Eligibility Request Form, September 5, 1997.

2. Letter from Mr. Richard Corey of the ARB to Mr. Ronald Block of Block Environmental Services notifying Block Environmental Services that PennzSuppress® D was eligible for the ARB Equipment Precertification Program and transmitting an estimate of fees required for Precertification, October 3, 1997.

3. Letter from Mr. Ronald Block of Block Environmental Services (representing Pennzoil-Quaker State Company) to Mr. Richard Corey of the ARB confirming that Pennzoil has the ownership and manufacturing rights for PennzSuppress® D, April 6, 1998.

4. Letter from Mr. Richard Corey of the ARB to Mr. Ronald Block of Block Environmental Services providing Block Environmental Services with guidance in preparing an application for the ARB Equipment Precertification Program for PennzSuppress® D, January 11, 1999.

5. Letter from Mr. Jeffery Kane of block Environmental Services (representing Pennzoil-Quaker State Company) to Mr. Richard Corey of the ARB transmitting an Application for Precertification, the Midwest Research Institute (Midwest) Emissions Test Program Results, an application fee, and a sample bottle of PennzSuppress® D, August 10, 1999.

6. Letter from Mr. Richard Corey of the ARB to Mr. Ron Block of Block Environmental Services that the ARB had received its application package and application fee and that the application was sufficiently complete, August 13,1999.

7. Letter from Mr. Jeffrey Kane of Block Environmental Services (representing Pennzoil-Quaker State Company) to Ms. Kitty Martin of the ARB transmitting the results of a laboratory analysis of PennzSuppress® D, August 13, 1999.

8. Memorandum from Mr. Raymond E. Menebroker of the ARB's Stationary Source Division to Mr. George Lew of the ARB's Monitoring and Laboratory Division requesting assistance in the evaluation of the Midwest Emissions Testing Program Results for PennzSuppress® D, August 16, 1999.

9. Letter from Mr. Jeffrey Kane of Block Environmental Services (representing Pennzoil-Quaker State Company) to Ms. Kitty Martin of the ARB transmitting the results of a second laboratory analysis of PennzSuppress® D, August 17, 1999.

10. Letter from Mr. Jeffrey Kane of Block Environmental Services to Ms. Kitty Martin of the ARB providing a revised PennzSuppress® D air performance claim and supporting information, September 2, 1999.

11. Letter from Mr. Richard Corey of the ARB to Mr. Ron Block of Block Environmental Services notifying Block Environmental Services that the ARB had received a sample of PennzSuppress® D, two complete copies of the Midwest Emission Testing Program Results for PennzSuppress® D, and a letter of September 2, 1999, that transmitted revised wording and additional support of a proposed air quality-related claim, September 13, 1999.

12. Letter from Mr. Greg Muleski of Midwest Research Institute to Ms. Kitty martin of the ARB transmitting raw data for the Midwest Emission Testing Program Results for the PennzSuppress® D, September 30, 1999.

13. Memorandum from Mr. George Lew of the ARB's Monitoring and Laboratory Division to Mr. Raymond E. Menebroker of the ARB's Stationary Source Division providing comments on the Midwest Emissions Testing Program for PennzSuppress® D, November 18, 1999.

14. Letter from Mr. Hafizur Chowdhury of the ARB to Mr. Pat de Rose documenting the staff site visit (March 21, 2000) to observe his unpaved road that had been treated with PennzSuppress® D, March 29, 2000.

15. Memorandum from Mr. James D. Kuykendall of the California State Water Resources Control Board to Ms. Tam Doduc of the ARB's Office of Environmental Technology indicating that his agency did not oppose the ARB certification of PennzSuppress® D, April 12, 2000.

16. Letter from Mr. Donald E. Fogle of the California Department of Transportation (Caltrans) to Mr. Colin Kimball of the Pennzoil-Quaker State company informing him that his agency had approved PennzSuppress® D for uses as a dust suppressant on future projects where a dust suppressant is required, March 28, 2000.

17. Gilles, J., et al. "Long-Term Efficiencies of Dust Suppressants to Reduce PM_{10} Emissions from Unpaved Roads". Journal of the Air and Waste Management Association 49 (January 1999): 3-16.

18. South Coast Air Quality Management District. Rule 403 Implementation Handbook. 1999.

19. United States Environmental Protection Agency Air and Energy Engineering Research Laboratory. Evaluation of the Effectiveness of Chemical Dust Suppressants on Unpaved Roads. (EPA-600/2-87-102). 1987.

20. Pennzoil-Quaker State Company. Specialty Plant Quality System Manual. October 27, 1997.

21. PennzSuppress® D Recommended Practices for Reducing the Generation of Airborne Particulate Matter from Unpaved Roads. Available at www.pennzsuppress.com May 01, 2000.

22. Memorandum from Mr. Greg Williams of the State of California Department of Toxic Substance Control to Mr. Richard Corey of the ARB indicating that his agency did not have any concerns with the ARB's plan to certify PennzSuppress® D, May 24, 2000.

23. Application for Certification of PennzSuppress® D Water Related Claims California Environmental Technology Certification Program, October 27, 1999, submitted by Mr. Ron Block of Block Environmental Services to Mr. Bryan Brock of the State of California Water Resources Control Board.

24. Memorandum from Mr. Val F. Siebal of the State of California Office of Environmental Health Hazard Assessment to Ms. Tam Doduc of the Office of Environmental Technology, conveying their comments on the Application for Certification of PennzSuppress® D Water Related Claims California Environmental Technology Certification Program report, September 8, 2000.

25. Memorandum from Mr. James D. Kuykendall, State of California Water Resources Control Board to Ms. Tam Doduc of the Office of Environmental Technology, addressing the Office of Environmental Health Hazard Assessment's comments.